Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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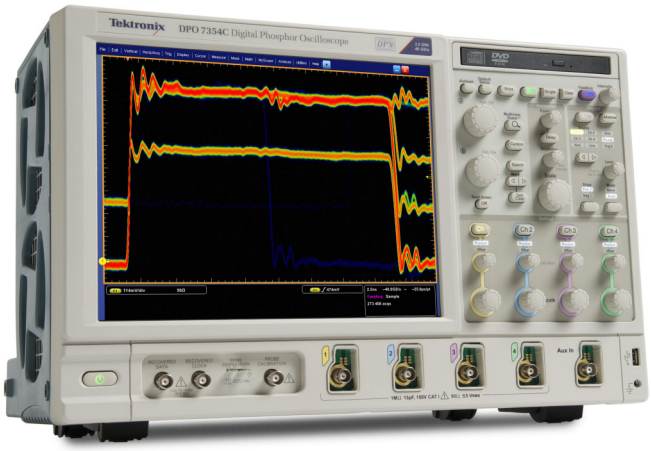
Digital Phosphor Oscilloscopes

DPO7000C Series Data Sheet



Features & Benefits

Key Performance Specifications

- 3.5 GHz, 2.5 GHz, 1 GHz, and 500 MHz Bandwidth Models
- Up to 40 GS/s Real-time Sample Rate on One Channel, up to 20 GS/s on Two Channels, and up to 10 GS/s on Three or Four Channels
- Up to 500 Megapoint Record Length with MultiView Zoom™
- >250,000 wfms/s Maximum Waveform Capture Rate with FastAcq™
- FastFrame™ Segmented Memory Acquisition Mode with >310,000 Waveforms per Second Capture Rate
- User-selectable Bandwidth Limit Filters for Better Low-frequency Measurement Accuracy

Ease-of-Use Features

- Pinpoint® Triggering provides the Most Flexible and Highest Performance Triggering, with over 1400 Combinations to Address Virtually Any Triggering Situation
- Visual Trigger Precisely Qualifies Triggers and Finds Unique Events in Complex Waveforms
- Advanced Search and Mark to Find Specific Events in the Entire Waveform
- MyScope® Custom Control Windows and Right Mouse Click Menus for Exceptional Efficiency
- 53 Automated Measurements, Waveform Histograms, and FFT Analysis for Simplified Waveform Analysis
- TekVPI® Probe Interface supports Active, Differential, and Current Probes for Automatic Scaling and Units
- 12.1 in. (307 mm) Bright XGA Display with Touch Screen

Connectivity

- USB Host Ports on the Front and Side Panels for Quick and Easy Data Storage, Printing, and Connecting USB Peripherals
- Integrated 10/100/1000BASE-T Ethernet Port for Network Connection and Video Out Port to Export the Oscilloscope Display to a Monitor or Projector
- Microsoft® Windows 7 64-bit Operating System for Easy Connectivity and Integration into Your Environment
- LXI Class C Compliant

Optional Serial Triggering and Analysis

- Automated Serial Triggering and Decode Options for I²C, SPI, RS-232/422/485/UART, and USB 2.0
- Automated Serial Analysis for MIPI® D-PHY DSI-1 and CSI-2
- Automated Serial Decode and Vehicle Network Monitoring of CAN and LIN
- Clock Recovery from Serial Data Streams
- 64-bit NRZ Serial Pattern Trigger for Isolation of Pattern-dependent Effects up to 1.25 Gb/s

Optional Technology Specific Analysis

- Software Solutions provide Built-in Domain Expertise for MIPI® D-PHY, Ethernet, and USB 2.0 Compliance Testing, Jitter, Timing, Eye Diagrams, Power, DDR Memory Bus Analysis, and Wideband RF
- Limit and Mask Testing provide Quick Insight into Signal Characteristics

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Tektronix®

Simplified Analysis for Complex Digital Designs

With the DPO7000C Digital Phosphor Oscilloscope Series, you can analyze analog and serial bus signals with a single instrument to quickly find and diagnose problems in complex designs. Bandwidths up to 3.5 GHz and sample rates up to 40 GS/s ensure you have the performance you need to see fast-changing signal details. To capture long windows of signal activity while maintaining fine timing resolution, the DPO7000C Series offers a deep record length of up to 12.5M points standard on all channels and an optional record length of up to 500M points on one channel.

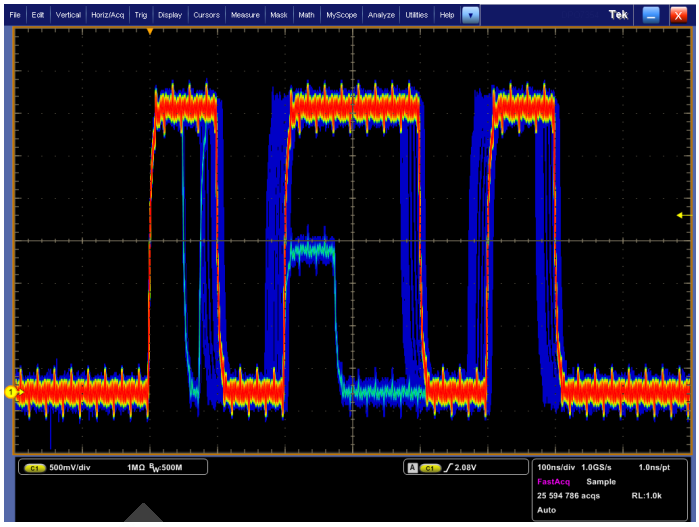
With Advanced Search and Mark and MultiView Zoom™ features for rapid waveform navigation, and more than 15 optional software and analysis packages for common technologies and in-depth analysis tasks, the DPO7000C Series from Tektronix provides the feature-rich tools you need to simplify and speed debug of your complex design.

Comprehensive Features Speed Every Stage of Debug

The DPO7000C Series offers a robust set of features to speed every stage of debugging your design – from quickly discovering an anomaly and capturing it, to searching your waveform record for the event and analyzing its characteristics and your device's behavior.

Discover

To debug a design problem, first you must know it exists. Every design engineer spends time looking for problems in their design, a time-consuming and frustrating task without the right debug tools.



Discover – Fast waveform capture rate - over 250,000 wfm/s - maximizes the probability of capturing elusive glitches and other infrequent events.

The DPO7000C Series offers the industry's most complete visualization of signals, providing fast insight into the real operation of your device. Tektronix proprietary FastAcq™ technology delivers a fast waveform capture – greater than 250,000 waveforms per second – that enables you to see glitches and other infrequent transients within seconds, revealing the true nature of device faults. A digital phosphor display with color intensity grading shows the history of a signal's activity by using color to identify areas of the signal that occur more frequently, providing a visual display of just how often anomalies occur.

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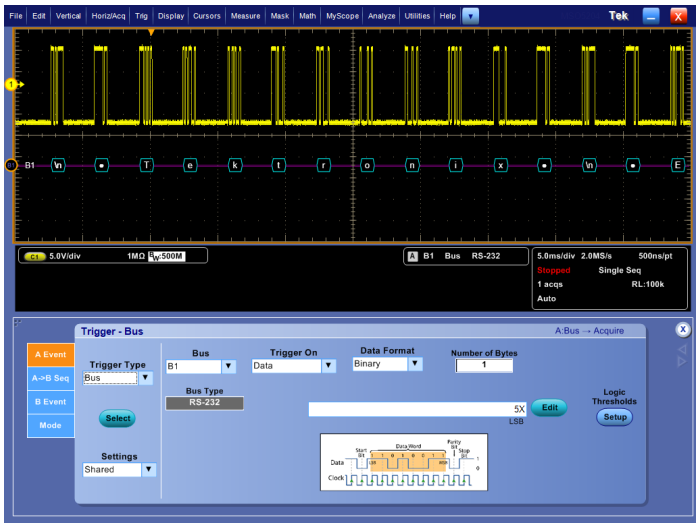

Capture – Triggering on a specific transmit data packet going across an RS-232 bus. A complete set of triggers, including triggers for specific serial packet content, ensures you quickly capture your event of interest.

Search – Results of an advanced search for a runt pulse or a narrow glitch within a long waveform record. Each instance of the runt or glitch is automatically marked for easy reference.

Capture

Discovering a device fault is only the first step. Next, you must capture the event of interest to identify root cause.

The DPO7000C Series provides a complete set of triggers – including runt, glitch, width, timeout, transition, pattern, state, setup/hold violation, window, comm, and serial pattern – to help quickly find your event. Enhanced Triggering reduces trigger jitter at the trigger point. In this mode, the trigger point can be used as a measurement reference.

To enable complex system debug and validation, the DPO7000C Series provides Pinpoint® triggering, using Silicon Germanium (SiGe) technology to provide trigger performance up to the bandwidth of the oscilloscope and over 1400 trigger combinations. Most other trigger systems offer multiple trigger types only on a single event (A event), with the delayed trigger (B event) selection limited to edge-type triggering, and often do not provide a way to reset the trigger sequence if the B event doesn't occur. But Pinpoint triggering provides a full suite of advanced trigger types on both A and B triggers with Reset triggering to begin the trigger sequence again after a specified time, state, or transition so that even events in the most complex signals can be captured.

Finding the right characteristic of a complex signal can require hours of collecting and sorting through thousands of acquisitions for the event of interest. Defining a trigger that isolates the desired event and shows data only when the event occurs speeds up this process. The optional Visual Trigger makes the identification of the desired waveform events quick and easy by scanning through all waveform acquisitions and comparing them to on-screen areas (geometric shapes).

With up to a 500M point record length, you can capture many events of interest, even thousands of serial packets, in a single acquisition for further analysis while maintaining high resolution to zoom in on fine signal details. Investigate multiple segments of your waveform capture simultaneously with MultiView Zoom™ to quickly compare events in real time. FastFrame™ Segmented Memory mode enables you to make efficient use of large records by capturing many trigger events in a single record eliminating large time gaps between events of interest. View and measure the segments individually or as an overlay.

From triggering on specific packet content to automatic decode in multiple data formats, the DPO7000C Series provides integrated support for a broad range of serial buses – I²C, SPI, RS-232/422/485/UART, USB 2.0, CAN, LIN, and MIPI D-PHY. The ability to decode up to 16 serial buses simultaneously means you gain insight into system-level problems quickly.

Search

Finding your event of interest in a long waveform record can be time consuming without the right search tools. With today's record lengths pushing beyond a million data points, locating your event can mean scrolling through thousands of screens of signal activity.

The DPO7000C Series offers the industry's most comprehensive search and waveform navigation with the standard Advanced Search and Mark feature and front-panel controls. User marks allow you to mark any location that you may want to reference later for further investigation. Or, automatically search your entire record for the criteria you define. Along the way it will automatically mark every occurrence of your defined event so you can quickly move between events. The advanced search and mark capability of the DPO7000C Series can search for up to eight different events simultaneously and stop a live acquisition when it finds an event of interest, saving even more time.

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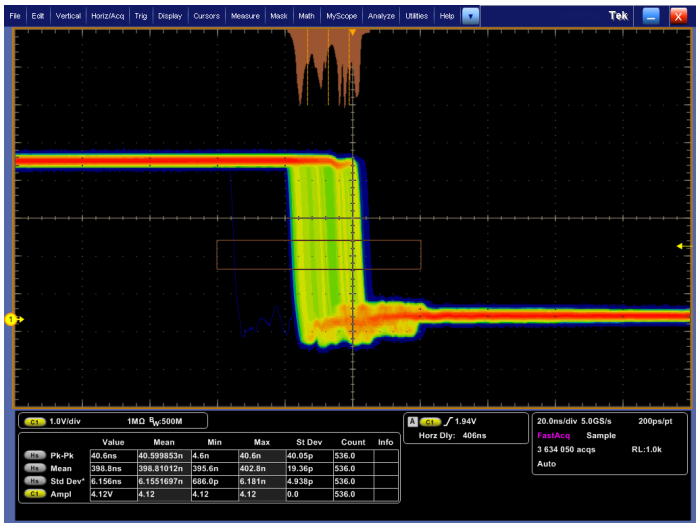


Analyze – Waveform histogram of a falling edge showing the distribution of edge position (jitter) over time. Included are numeric measurements made on the waveform histogram data. A comprehensive set of integrated analysis tools speeds verification of your design's performance.

Analyze

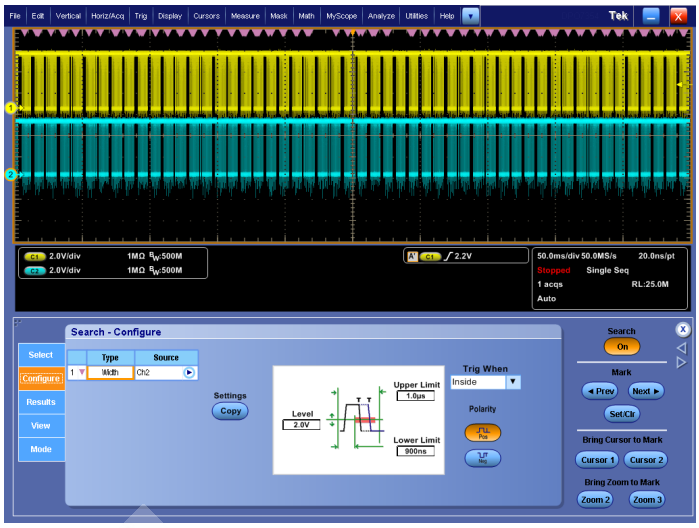
Verifying that your prototype's performance matches simulations and meets the project's design goals requires analyzing its behavior. Tasks can range from simple checks of rise times and pulse widths to sophisticated power loss analysis, characterization of system clocks, and investigation of noise sources. The DPO7000C Series offers a comprehensive set of integrated analysis tools including waveform- and screen-based cursors, 53 automated measurements, advanced waveform math including arbitrary equation editing, waveform histograms, and FFT analysis.

Every DPO7000C Series oscilloscope includes the DPOJET Essentials jitter and eye pattern analysis software package, extending the oscilloscope's measurement capabilities to make measurements over contiguous clock and data cycles in a single-shot real-time acquisition. This enables measurement of key jitter and timing analysis parameters such as Time Interval Error and Phase Noise to help characterize possible system timing issues. Analysis tools such as plots for time trends and histograms quickly show how timing parameters change over time, and spectrum analysis quickly shows the precise frequency and amplitude of jitter and modulation sources.

Specialized application support for serial bus debug and compliance test, jitter and eye pattern analysis, power supply design, limit and mask testing, DDR memory bus analysis, and wideband RF is also available.

Advanced Search and Mark

A 12.5M point standard record length represents thousands of screens of information. The DPO7000C Series enables you to find your event in seconds with Advanced Search and Mark.



Search step 1: You define what you would like to find.

Search step 2: Advanced Search and Mark automatically searches through the record and marks each event with a solid colored triangle. You can then use the **Previous** and **Next** buttons to jump from one event to the next.

User Marks

Press the **Set/Clear** front-panel button to place one or more marks on the waveform. Navigating between marks is as simple as pressing the **Previous** (←) and **Next** (→) buttons on the front panel.

Search Marks

The **Search** button allows you to automatically search through your long acquisition looking for user-defined events. All occurrences of the event are highlighted with search marks and are easily navigated to, using the front-panel **Previous** (←) and **Next** (→) buttons. Search types include edge, glitch, width, timeout, runt, pattern, state, setup and hold, transition, and window.

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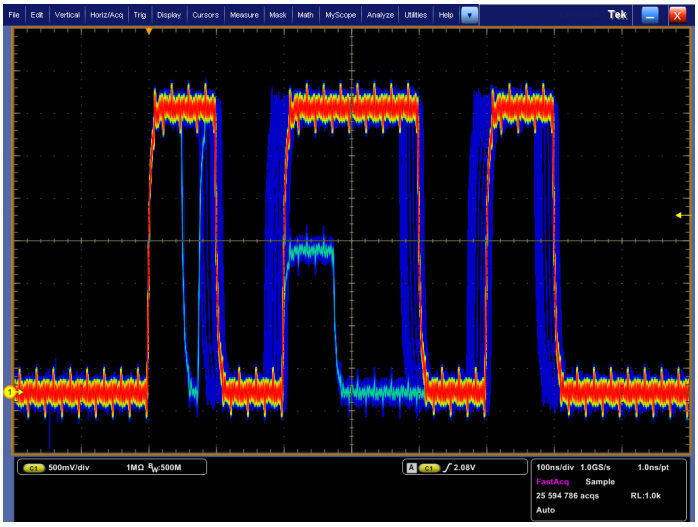


Digital phosphor technology enables greater than 250,000 wfm/s waveform capture rate and real-time color grading on the DPO7000C Series.

Digital Phosphor Technology

The DPO7000C Series' digital phosphor technology provides you with fast insight into the real operation of your device. Its fast waveform capture rate – greater than 250,000 wfm/s – gives you a high probability of quickly seeing the infrequent problems common in digital systems: runt pulses, glitches, timing issues, and more.

Waveforms are superimposed with one another and waveform points are color coded by frequency of occurrence. This quickly highlights the events that occur more often over time or, in the case of infrequent anomalies, occur less often.

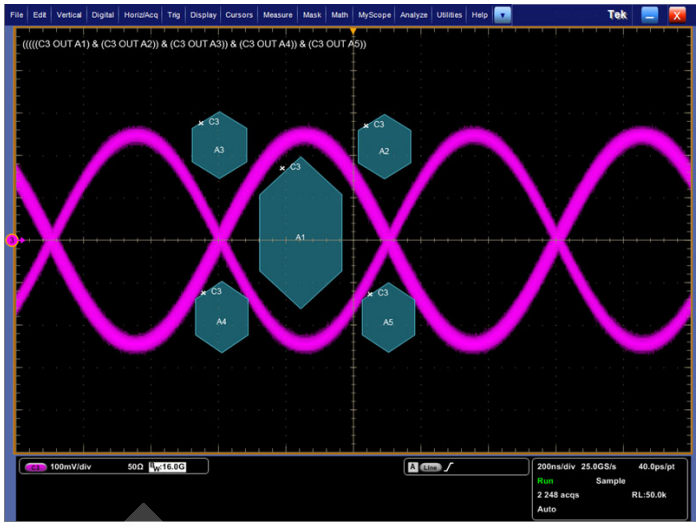
With the DPO7000C Series, you can choose infinite persistence or variable persistence, determining how long the previous waveform acquisitions stay on-screen. This allows you to determine how often an anomaly is occurring.

Visual Trigger (Optional)

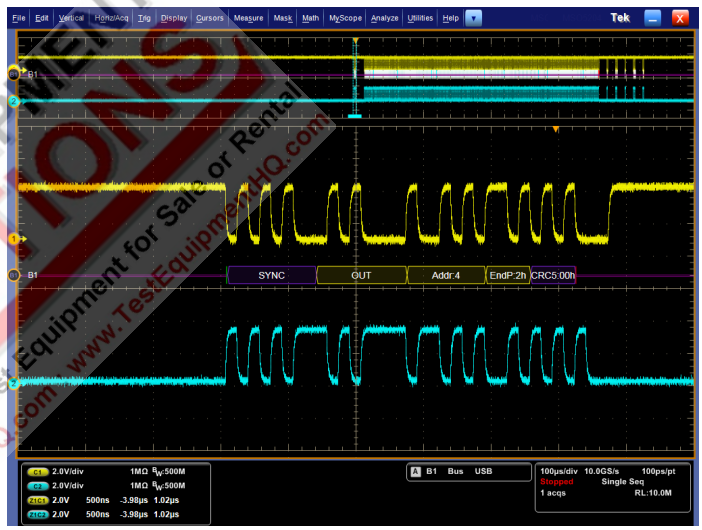
The Visual Trigger option adds an additional dimension to the standard trigger system that provides an intuitive method of triggering based on shapes in the oscilloscope's graticule. It enables the user to define shapes on the oscilloscope's display that qualify trigger events for the incoming signals. Areas can be created using a variety of shapes including triangles, rectangles, hexagons, or trapezoids to fit the area to the particular trigger behavior desired. Once shapes are created on the oscilloscope's display, they can be positioned and/or re-sized dynamically while the oscilloscope is in Run mode to create ideal trigger conditions. Visual Trigger can be combined with the standard triggers and act as a Boolean logic qualifier for the "A" and "B" events.

Serial Triggering and Analysis (Optional)

On a serial bus, a single signal often includes address, control, data, and clock information. This can make isolating events of interest difficult. The DPO7000C Series offers a robust set of tools for debugging serial buses



Eye Diagram triggering using optional Visual Trigger.



Triggering on a specific OUT Token packet on a USB full-speed serial bus. A bus waveform provides decoded packet content including Start, Sync, PID, Address, End Point, CRC, Data values, and Stop.

with automatic trigger and decode on I²C, SPI, RS-232/422/485/UART, CAN, LIN, and USB 2.0, and decode for MIPI D-PHY DSI-1 and CSI-2 serial buses.

Serial Triggering

Trigger on packet content such as start of packet, specific addresses, specific data content, unique identifiers, etc. on popular serial interfaces such as I²C, SPI, RS-232/422/485/UART, CAN, and USB 2.0.

Bus Display

Provides a higher-level, combined view of the individual signals (clock, data, chip enable, etc.) that make up your bus, making it easy to identify where packets begin and end and identifying subpacket components such as address, data, identifier, CRC, etc.

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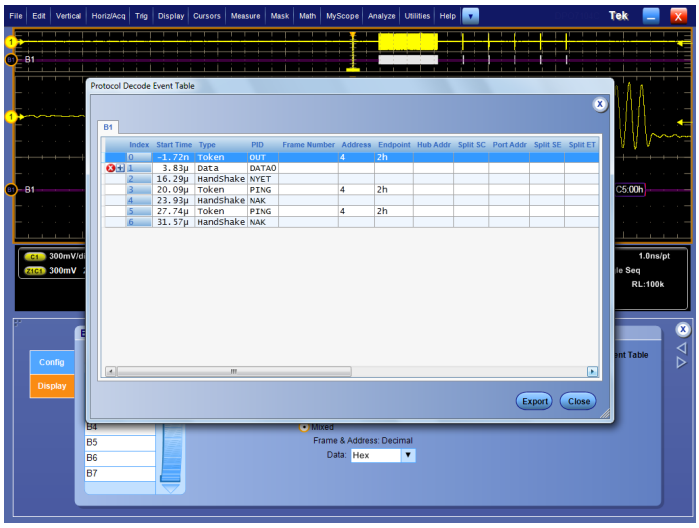
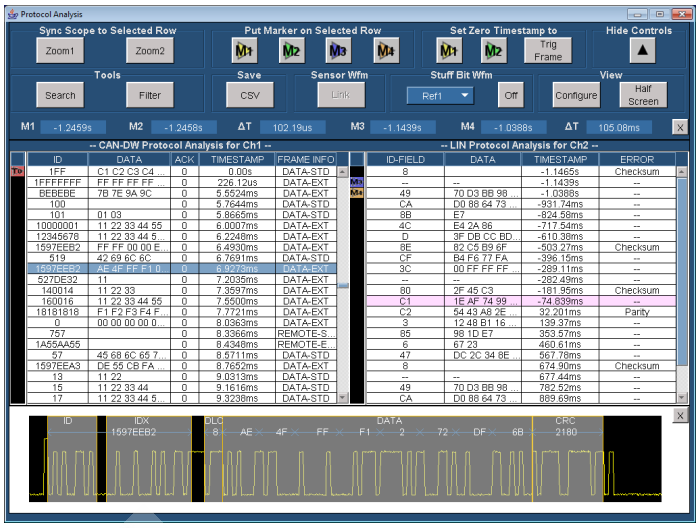


Event table showing decoded serial packet data in a long acquisition.



CAN and LIN Timing and Protocol Decode.

Bus Decoding

Tired of having to visually inspect the waveform to count clocks, determine if each bit is a 1 or a 0, combine bits into bytes, and determine the hex value? Let the oscilloscope do it for you! Once you've set up a bus, the DPO7000C Series will decode each packet on the bus, and display the value in hex, binary, decimal (USB only) or ASCII (USB and RS-232/422/485/UART only) in the bus waveform.

Event Table Display

In addition to seeing decoded packet data on the bus waveform itself, you can view all captured packets in a tabular view much like you would see in a software listing. Packets are time stamped and listed consecutively with columns for each component (Address, Data, etc.).

Bus Searching

Serial triggering is very useful for isolating the event of interest, but once you've captured it and need to analyze the surrounding data, what do you do? In the past, users had to manually scroll through the waveform counting and converting bits and looking for what caused the event. With the DPO7000C Series, you can have the oscilloscope automatically search through the acquired data for user-defined criteria including serial packet content. Each occurrence is highlighted by a search mark. Rapid navigation between marks is as simple as pressing the **Previous** (←) and **Next** (→) buttons on the front panel.

CAN and LIN Timing and Protocol Decode Software (Optional)

The optional CAN/LIN serial analysis software package (Option LSA) enables you to ensure seamless and reliable operation of a CAN or LIN network. The software measures oscillator tolerance and propagation delay on CAN buses, provides CAN triggering, and simultaneously decodes CAN and LIN messages.

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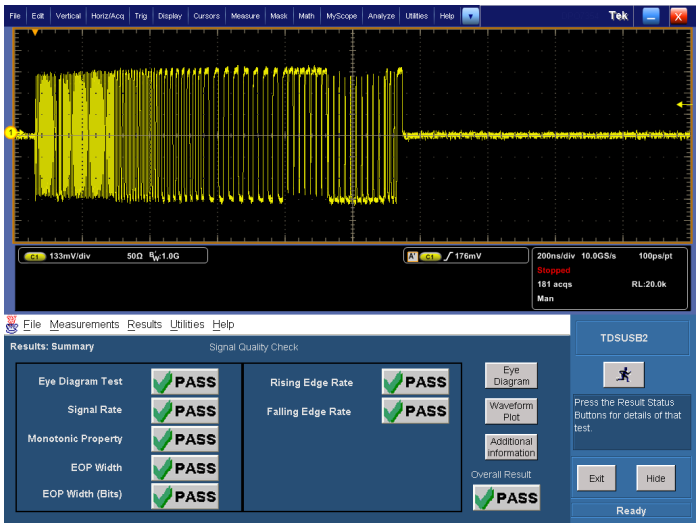


USB 2.0 Compliance Testing.

Switching Loss measurements. Automated power measurements enable quick and accurate analysis of common power parameters.

Serial Bus Compliance Test (Optional)

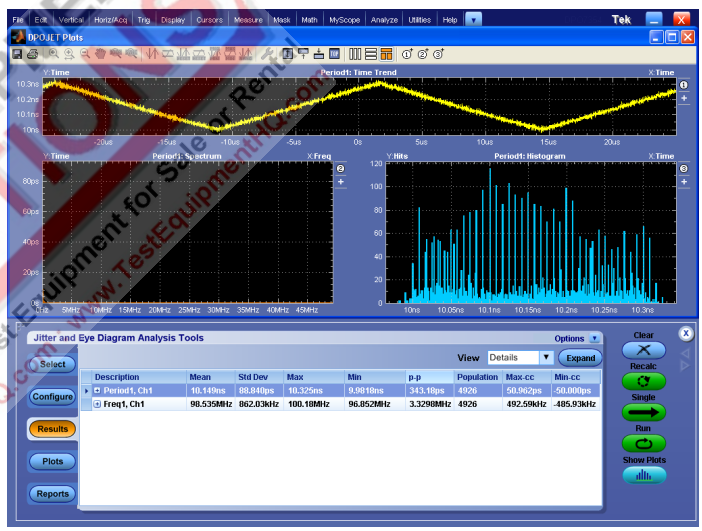
Software packages for automated compliance test are available for MIPI D-PHY (Option D-PHY), Ethernet 10BASE-T, 100BASE-TX, and 1000BASE-T (Option ET3), and USB 2.0 (Option USB) physical-layer devices. These software packages enable you to conduct testing using the standard's specified compliance tests.

Power Analysis (Optional)

The optional power analysis software package (Option PWR) enables quick and accurate analysis of power quality, switching loss, harmonics, magnetic measurements, safe operating area (SOA), modulation, ripple, and slew rate (di/dt, dv/dt). Automated, repeatable power measurements are available with a touch of a button; no external PC or complex software setup is required. The package includes a report generation tool to create customizable, detailed reports to document your measurement results.

Advanced Analysis, Jitter, Timing, and Eye Diagram Measurements (Optional)

The optional DPOJET Advanced software package (Option DJA) offers extended capabilities, providing a complete suite of analysis tools for insight into jitter and timing as well as other signal quality issues. DPOJET Advanced adds advanced tools such as Rj/Dj separation, eye diagram masks, and Pass/Fail limits for conformance testing. The innovative



Advanced Analysis, Jitter, Eye Diagram, and Timing measurements.

one-touch wizard makes setup for jitter measurements easy. DPOJET Advanced is also a measurement framework that works in conjunction with standards-specific compliance test packages for applications such as DDR memory and USB.

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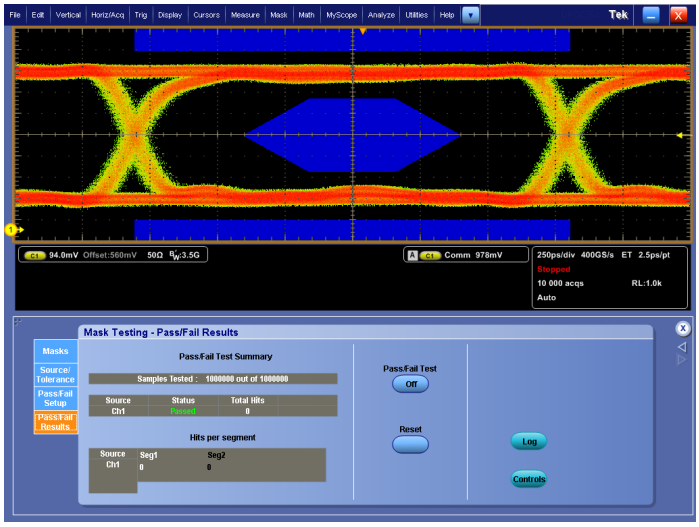

Mask testing an OC-12 signal, capturing any violations of the mask.

Limit and Mask Testing (Optional)

The optional limit test (Option LT) and mask test (Option MTM) software packages are useful for long-term signal monitoring, characterizing signals during design, and testing on a production line. The limit test software compares a tested signal to a known good or "golden" version of the same signal with user-defined vertical and horizontal tolerances. The mask test software includes a robust set of masks for telecommunications and computer standards for easily checking compliance to a standard. Additionally, custom masks can be created and used for characterizing signals. With both software packages you can tailor a test to your specific requirements by defining test duration in a number of waveforms, setting a violation threshold that must be met before considering a test a failure, counting hits along with statistical information, and setting actions upon violations, test failure, and test complete. Whether specifying a limit template or a mask, conducting pass/fail tests in search of waveform anomalies such as glitches has never been easier.

DDR Memory Bus Analysis (Optional)

The optional DDR memory analysis software package (Option DDRA) automatically identifies DDR1, DDR2, DDR3, LP-DDR, LP-DDR2, and GDDR3 Reads and Writes and makes JEDEC conformance measurements with Pass/Fail results on all edges in every Read and Write burst, perfect for debugging and troubleshooting DDR memory buses. Also provided are common measurements of clock, address, and control signals. Used in conjunction with DPOJET (Option DJA), Option DDRA is the fastest way to debug complex memory signaling issues.

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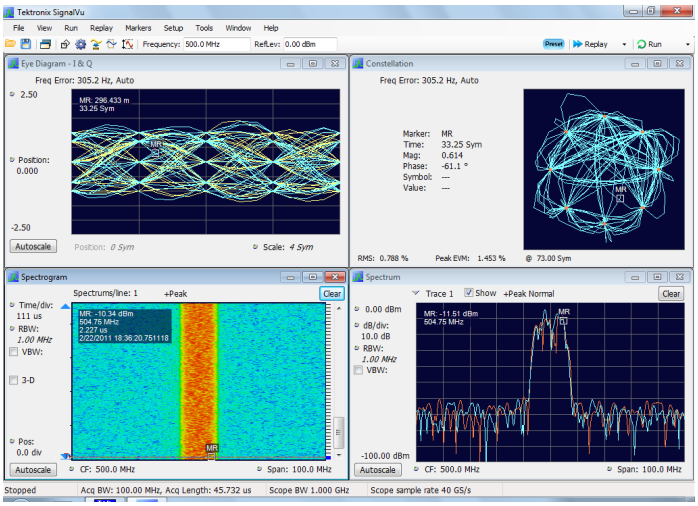

SignalVu™ enables detailed analysis in multiple domains.

Vector Signal Analysis (Optional)

The optional SignalVu™ vector signal analysis packages (Options SVE, SVM, SVO, SVP, and SVT) easily validate wideband designs and characterize wideband spectral events. By combining the signal analysis engine of Tektronix real-time spectrum analyzers with the wide bandwidth acquisition of Tektronix digital oscilloscopes, you can now evaluate complex baseband signals directly on your oscilloscope. You get the functionality of a vector signal analyzer, a spectrum analyzer, and the powerful trigger capabilities of a digital oscilloscope – all in a single package. Whether your design validation needs include wideband radar, high data-rate satellite links, or frequency-hopping communications, SignalVu™ vector signal analysis software can speed your time-to-insight by showing you time-variant behavior of these wideband signals.

Designed to Make Your Work Easier

Large, High-resolution Display

The DPO7000C Series features a 12.1 in. (307 mm) XGA color display with an integrated touch screen for seeing intricate signal details.

Dedicated Front-panel Controls

Per-channel vertical controls provide simple and intuitive operation. No longer do you need to share one set of vertical controls across all four channels.

TekVPI probe interface simplifies connecting your probes to the oscilloscope.

Connectivity

USB 2.0 host ports on the front and side panels enable easy transfer of screenshots, instrument settings, and waveform data to a USB thumb drive. The rear panel contains a GPIB port for controlling the oscilloscope remotely from a computer. An integrated 10/100/1000BASE-T Ethernet port enables easy connection to networks and a Video Out port allows the oscilloscope display to be exported to an external monitor or projector. PS-2 ports for keyboard and mouse are included for security-conscious applications that require the USB ports to be disabled. A standard removable hard disk drive makes customizing settings for different users easy as well as enables use in secure environments.

TekVPI® Probe Interface

The TekVPI probe interface sets the standard for ease of use in probing. TekVPI probes feature status indicators and controls, as well as a probe menu button right on the probe itself. This button brings up a probe menu on the oscilloscope display with all relevant settings and controls for the probe. The TekVPI interface enables direct attachment of a current probe without requiring a separate power supply. TekVPI probes can be controlled remotely through USB, GPIB, or Ethernet, enabling more versatile solutions in ATE environments.

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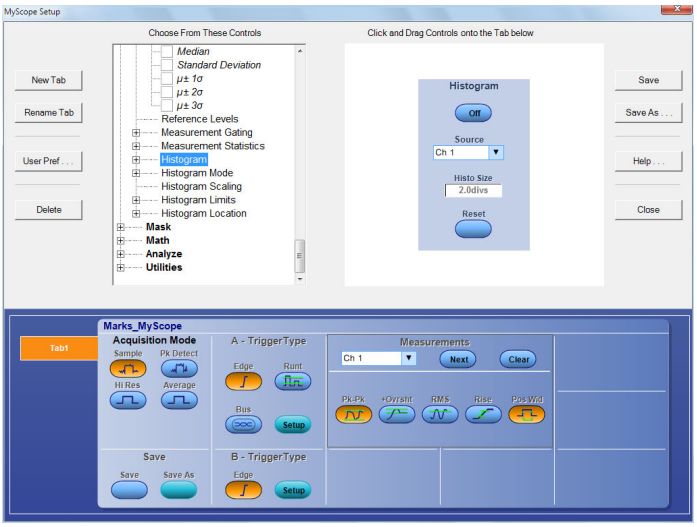

MyScope custom control windows are created with a simple drag-and-drop process enabling each user to have a unique interface.

MyScope® Custom Control Window

Easily create your own personalized "toolbox" of oscilloscope features in a matter of minutes using a simple, visual, drag-and-drop process. Once created, these custom control windows are easily accessed through a dedicated MyScope menu selection on the oscilloscope. This is ideal in a shared resource environment where each person can have their own custom control interface suited to their particular use. MyScope control windows benefit all oscilloscope users, eliminating the ramp-up time that many face when returning to the lab after not using an oscilloscope for a while, and enabling power users to be far more efficient.

Floating Licenses

Floating licenses offer an alternative method to manage your Tektronix asset. Floating licenses allow license-key enabled options to be easily moved among all your MSO/DPO5000, DPO7000, and DPO/DSA/MSO70000 Series of Tektronix oscilloscopes. Floating licenses are available for many license-key enabled options. To order a floating version of an option license add “DPOFL-“ prefix to the option name. (e.g. DPOFL-ET3)

Check www.tektronix.com for additional information about floating license options.

Interoperability with Logic Analyzer for Digital Design and Debug

The Tektronix Integrated View (iView™) data display enables digital designers to solve signal integrity challenges and effectively debug and verify their systems more quickly and easily. This integration allows designers to view time-correlated digital and analog data in the same display windows, and isolate the analog characteristics of the digital signals that are causing system failures. No user calibration is required. And, once set up, the iView feature is completely automated.

Remote Operation and Extended Analysis

There are many ways to connect to your DPO7000C Series oscilloscope to conduct extended analysis. The first makes use of the Windows Remote Desktop capability – connect directly to your oscilloscope and operate the user interface remotely through the built-in Remote Desktop. A second way to connect is through Tektronix OpenChoice® software which makes use of the fast embedded bus, transferring waveform data directly from acquisition to analysis applications on the Windows desktop at much faster speeds than conventional GPIB transfers. Industry-standard protocols, such as TekVISA™ interface and ActiveX controls are included for using and enhancing Windows applications for data analysis and documentation. IVI-COM instrument drivers are included to enable easy communication with the oscilloscope using GPIB, serial data, and LAN connections from programs running on the instrument or an external PC. Or, use the Software Developer's Kit (SDK) to help create custom software to automate multistep processes in waveform collection and analysis with Visual BASIC, C, C++, MATLAB, LabVIEW, LabWindows/CVI, and other common Application Development Environments (ADE). Microsoft® Excel and Word toolbars are included to simplify data capture and transfer directly to these programs running on the Windows desktop. A third way to connect to your oscilloscope is through NI LabVIEW SignalExpress Tektronix Edition, enabling you to instantly acquire, generate, analyze, compare, import, and save measurement data and signals using an intuitive drag-and-drop user interface that does not require any programming.

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Characteristics

Vertical System Analog Channels

Characteristic	DPO7054C	DPO7104C	DPO7254C	DPO7354C
Input Channels	4			
Bandwidth	500 MHz	1 GHz	2.5 GHz	3.5 GHz
Rise Time 10% to 90% (Typical)	460 ps	300 ps	160 ps	115 ps
Rise Time 20% to 80% (Typical)	310 ps	200 ps	100 ps	95 ps
DC Gain Accuracy	±1% with offset/position set to 0			
Bandwidth Limits	Depending on instrument model: 3.0 GHz, 2.5 GHz, 2 GHz, 1 GHz, 500 MHz, 250 MHz, and 20 MHz			
Input Coupling	AC, DC, GND			
Input Impedance	1 MΩ ±1% with 13 pF ±2 pF, 50 Ω ±1%			
Input Sensitivity	1 MΩ: 1 mV/div to 10 V/div 50 Ω: 1 mV/div to 1 V/div			
Vertical Resolution	8 bit (>11 bit with Hi Res)			
Max Input Voltage, 1 MΩ	±150 V CAT I, derate at 20 dB/decade to 9 V_{RMS} above 200 kHz			
Max Input Voltage, 50 Ω	5 V_{RMS}, with peaks ≤ ±24 V			
Position Range	±5 divisions			
Delay between any Two Channels (Typical)	≤100 ps (50 Ω, DC coupling and equal V/div at or above 10 mV/div)			
Offset Range	1 mV/div to 50 mV/div: ±1 V 50.5 mV/div to 99.5 mV/div: ±(1.5 V – 10 divisions) 100 mV/div to 500 mV/div: ±10 V 505 mV/div to 995 mV/div: ±(15 V – 10 divisions) 1 V/div to 5 V/div: ±100 V 5.05 V/div to 10 V/div: ±(150 V – 10 divisions)			
Offset Accuracy	1 mV/div to 9.95 mV/div: ±0.2% × (offset – position) ±0.1 div ±1.5 mV 10 mV/div to 99.5 mV/div: ±0.35% × (offset – position) ±0.1 div ±1.5 mV 100 mV/div to 1 V/div: ±0.35% × (offset – position) ±0.1 div ±15 mV 1.01 V/div to 10 V/div: ±0.25% × (offset – position) ±0.1 div ±150 mV			
Channel-to-Channel Isolation (Any two channels at equal Vertical Scale settings) (Typical)	≥100:1 at ≤100 MHz ≥30:1 between 100 MHz and 2.5 GHz ≥20:1 between 2.5 GHz and 3.5 GHz			

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Horizontal System Analog Channels

Characteristic	DPO7054C	DPO7104C	DPO7104C with Option 2SR	DPO7254C / DPO7354C
Maximum Sample Rate (1 ch)	20 GS/s	20 GS/s	40 GS/s	40 GS/s
Maximum Sample Rate (2 ch)	10 GS/s	10 GS/s	20 GS/s	20 GS/s
Maximum Sample Rate (3-4 ch)	5 GS/s	5 GS/s	10 GS/s	10 GS/s
Maximum Equivalent Time Sampling Rate	4 TS/s			
Maximum Record Length with Standard Configuration	50M (1 ch), 25M (2 ch), 12.5M (3-4 ch)			
Maximum Record Length with Option 2RL	125M (1 ch), 50M (2 ch), 25M (3-4 ch)			
Maximum Record Length with Option 5RL	250M (1 ch), 125M (2 ch), 50M (3-4 ch)			
Maximum Record Length with Option 10RL	—			500M (1 ch) 250M (2 ch) 125M (3-4 ch)
Maximum Duration at Highest Real-time Sample Rate (1 ch)	1-2 ms with standard record length, up to 10 ms with optional record length			
Time Base Range	50 ps/div to 1000 s/div	50 ps/div to 1000 s/div	25 ps/div to 1000 s/div	25 ps/div to 1000 s/div
Time Resolution (in ET/IT mode)	500 fs	500 fs	250 fs	250 fs
Time Base Delay Time Range	5 ns to 250 s			
Channel-to-Channel Deskew Range	±75 ns			
Delta Time Measurement Accuracy	((0.06 / sample rate) + (2.5 ppm × Reading)) RMS			
Trigger Jitter (RMS)	1.5 ps_{RMS} with enhanced triggering OFF <100 fs_{RMS} with enhanced triggering ON			
Jitter Noise Floor	<1 ps_{RMS} (<2 ps_{Peak}) for record duration <10 µs (typical) <2.5 ps_{RMS} for record duration <30 ms <65 parts/trillion for record durations <10 s			
Time Base Accuracy	±2.5 ppm + aging <1 ppm per year			

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Acquisition Modes

Mode	Description
Sample	Acquire sampled values
Peak Detect	Captures narrow glitches at all real-time sampling rates: 1/sample rate at ≤10 GS/s
Averaging	From 2 to 10,000 waveforms included in average
Envelope	From 1 to 2×10^9 waveforms included in min-max envelope
Hi Res	Real-time boxcar averaging reduces random noise and increases resolution
Roll	Scrolls sequential waveform points across the display in a right-to-left rolling motion at sweep speeds slower than 50 ms/div. Up to 10 MS/s with a maximum record length of 40M
FastAcq Acquisition Mode	FastAcq optimizes the instrument for analysis of dynamic signals and capture of infrequent events
Maximum FastAcq Waveform Capture Rate	>250,000 wfms/s on all 4 channels simultaneously
Waveform Database	Accumulate waveform database providing three-dimensional array of amplitude, time, and counts
FastFrame™ Acquisition	Acquisition memory divided into segments; maximum trigger rate >310,000 waveforms per second. Time of arrival recorded with each event. Frame Finder tool helps to visually identify transients

Pinpoint® Trigger System

Characteristic	Description
Trigger Sensitivity	
Internal DC Coupled	0.7 div DC to 50 MHz, increasing to 1.2 div at rated analog bandwidth (typical), up to 2.5 GHz; 2.5 div at 3.5 GHz
External (Auxiliary Input) 1 MΩ	250 mV from DC to 50 MHz, increasing to 350 mV at 250 MHz (typical)
Trigger Characteristics	
A Event and Delayed B Event Trigger Types	Edge, Glitch, Width, Runt, Timeout, Transition Time, Logic Pattern, Logic State, Setup/Hold, Window – all except Edge, Pattern, and State can be Logic State qualified by up to two channels
Trigger Delay by Time	5 ns to 250 s
Trigger Delay by Events	1 to 10,000,000 events
Optional Serial Protocol Trigger Types (A Event only)	I^2C, SPI, RS-232, CAN, USB 2.0
Main Trigger Modes	Auto, Normal, and Single
Enhanced Triggering	User-selectable; corrects the difference in timing between the trigger path and the acquired data path (supports all Pinpoint trigger types on both A and B Events except pattern trigger and not available in FastAcq)

Characteristic	Description
Trigger Sequences	Main, Delayed by Time, Delayed by Events, Reset by Time, Reset by State, Reset by Transition. All sequences can include separate horizontal delay after the trigger event to position the acquisition window in time
Communications-related Triggers	Requires Opt. MTM. Support for AMI, HDB3, BnZS, CMI, MLT3, and NRZ encoded communications signals. Select among isolated positive or negative one, zero pulse form, or eye patterns as applicable to the standard
Video Trigger Formats and Field Rates	Triggers from negative sync composite video, field 1 or field 2 for interlaced systems, any field, specific line, or any line for interlaced or noninterlaced systems. Supported systems include NTSC, PAL, SECAM, and HDTV 1080/24sF, 1080p/25, 1080i/50, 1080i/60, 1080p/24, 720p/60, 480p/60
Serial Pattern Trigger	(DPO7254C and DPO7354C only, requires Opt. ST1G) Up to 64-bit serial word recognizer, bit specified in binary (high, low, don't care) or hex format. Trigger on NRZ-encoded data up to 1.25 Gb/s
Clock Recovery System	(DPO7254C and DPO7354C only, requires Opt. ST1G or MTM)
Clock Recovery Phase Locked Loop Bandwidth	Fixed at FBaud/500
Clock Recovery Frequency Range	1.5 MBaud to 1.25 GBaud
Clock Recovery Jitter	20 ps_{RMS} + 1.25% Unit Interval RMS for PRBS data patterns 20 ps_{RMS} + 1.25% Unit Interval RMS for repeating "0011" data pattern
Clock Recovery Tracking/Acquisition Range	±5% of requested baud rate (typical)
Minimum Signal Amplitude Needed for Clock Recovery	1 div_{p-p} up to 1.25 GBaud (typical)
Trigger Level Range (Internal)	±12 divisions from center of screen
Trigger Level (Aux In)	TekVPI interface; ±5 V (50 Ω); 150 V CAT I, derate at 20 dB/decade to 9 V_{RMS} above 200 kHz (1 MΩ)
Trigger Level (Line)	Fixed at 0 V
Trigger Coupling	DC, AC (attenuates <60 Hz), HF Rej (attenuates >30 kHz), LF Rej (attenuates <80 kHz), Noise Reject (reduces sensitivity)
Trigger Holdoff Range	250 ns to 12 s

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Trigger Modes

Mode	Description
Edge	Positive or negative slope on any channel or front-panel auxiliary input. Coupling includes DC, AC, HF reject, LF reject, and noise reject
Glitch	Trigger on or reject glitches of positive, negative, or either polarity. Minimum glitch width is 170 ps (typical) with rearm time of 250 ps (for DPO7254C or DPO7354C)
Width	Trigger on width of positive or negative pulse either within or outside of selectable limits (225 ps to 10 s)
Runt	Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again. Event can be time or logic qualified
Window	Trigger on an event that enters or exits a window defined by two user-adjustable thresholds. Event can be time or logic qualified
Timeout	Trigger on an event which remains high, low, or either, for a specified time period (300 ps to 1 s)
Transition	Trigger on pulse edge rates that are faster or slower than specified. Slope may be positive, negative, or either
Setup/Hold	Trigger on violations of both setup time and hold time between clock and data present on any two input channels
Logic Pattern	Trigger when pattern goes false or stays true for specified period of time (300 ps to 1 s). Pattern (AND, OR, NAND, NOR) specified for all analog input channels defined as high, low, or don't care
Logic State	Any logical pattern of channels (1, 2, 3) clocked by edge on channel 4. Trigger on rising or falling clock edge
Parallel Bus	Trigger on specified data value on defined parallel bus
Video	Trigger on all lines, specific line number, odd, even, or all fields on NTSC, PAL, SECAM, and HDTV 480p/60, 576p/50, 875i/60, 720p/30, 720p/50, 720p/60, 1080/24sF, 1080i/50, 1080p/25, 1080i/60, 1080p/24, 1080p/25, 1080p/50, 1080p/60, Bi-level, Tri-level
Visual Trigger (Optional)	Provided as part of Opt. VET. Trigger on up to 8 user-specified areas, including rectangle, triangle, trapezoid, and hexagon shapes
Comm (Optional)	Provided as part of Opt. MTM. Support for AMI, HDB3, BnZS, CMI, MLT3, and NRZ encoded signals
I^2C (Optional)	Provided as part of Opt. SR-EMBD. Trigger on Start, Repeated Start, Stop, Missing ACK, Address (7 or 10 bit), Data (1-5 bytes), or Address and Data on I^2C buses up to 10 Mb/s
SPI (Optional)	Provided as part of Opt. SR-EMBD. Trigger on SS or data (10-16 words) on SPI buses up to 10 Mb/s
RS-232/422/485/UART (Optional)	Provided as part of Opt. SR-COMP. Trigger on Start Bit, End of Packet, Data (1-5 words), and Parity Error on RS-232 buses up to 10 Mb/s
USB 2.0 (Optional)	Provided as part of Opt. SR-USB. Low Speed: Trigger on Sync, Reset, Suspend, Resume, End of Packet, Token (Address) Packet, Data Packet, Handshake Packet, Special Packet, Error. Token Packet Trigger – Any token type, SOF, OUT, IN, SETUP; Address can be specified for Any, OUT, IN, and SETUP token types. Address can be further specified to trigger on ≤, <, =, >, ≥, != a particular value, or inside or outside of a range. Frame number can be specified for SOF token using Binary, Hex, Unsigned Decimal, and Don't Care digits. Data Packet Trigger – Any data type, DATA0, DATA1; Data can be further specified to trigger on ≤, <, =, >, ≥, != a particular data value, or inside or outside of a range. Handshake Packet Trigger – Any handshake type, ACK, NAK, STALL. Special Packet Trigger – Any special type, Reserved. Error Trigger – PID Check, CRC5 or CRC16, Bit Stuffing.
	Full Speed: Trigger on Sync, Reset, Suspend, Resume, End of Packet, Token (Address) Packet, Data Packet, Handshake Packet, Special Packet, Error. Token Packet Trigger – Any token type, SOF, OUT, IN, SETUP; Address can be specified for Any, OUT, IN, and SETUP token types. Address can be further specified to trigger on ≤, <, =, >, ≥, != a particular value, or inside or outside of a range. Frame number can be specified for SOF token using Binary, Hex, Unsigned Decimal, and Don't Care digits. Data Packet Trigger – Any data type, DATA0, DATA1; Data can be further specified to trigger on ≤, <, =, >, ≥, != a particular data value, or inside or outside of a range. Handshake Packet Trigger – Any handshake type, ACK, NAK, STALL. Special Packet Trigger – Any special type, PRE, Reserved. Error Trigger – PID Check, CRC5 or CRC16, Bit Stuffing.
	High Speed: No protocol-level triggering.
	Note: High Speed support only available on ≥1 GHz models.
CAN (Optional)	Provided as part of Opt. LSA
Serial Pattern (Optional)	Provided as part of Opt. ST1G. Captures serial data stream with built-in clock recovery for NRZ standards up to 1.25 Gb/s. Extended with pattern lock triggering to capture repeated acquisitions of long serial data patterns

Search and Mark Events

Characteristic	Description
Advanced Search and Mark	Automatically mark events and document waveforms. Search positive/negative slopes or both, glitches, runts, pulse widths, transition rate, setup and hold, timeout, windows, or find any logic or state pattern on any number of channels. Search DDR Read or Write bursts with Opt. DDRA. Event table summarizes all found events. All events are time stamped in reference to trigger position. Stop acquisitions when an event is found

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Waveform Measurements

Measurement	Description
Cursors	Waveform and Screen
Automatic Measurements	53, of which 8 can be displayed on-screen at any one time
Measurement Statistics	Mean, Minimum, Maximum, Standard Deviation
Reference Levels	User-definable reference levels for automatic measurements can be specified in either percent or units
Gating	Isolate the specific occurrence within an acquisition to take measurements on, using either screen or waveform cursors
Amplitude Related	Amplitude, High, Low, Maximum, Minimum, Peak-to-Peak, Mean, Cycle Mean, RMS, Cycle RMS, Positive Overshoot, Negative Overshoot
Time Related	Rise Time, Fall Time, Positive Width, Negative Width, Positive Duty Cycle, Negative Duty Cycle, Period, Frequency, Delay
Combination	Area, Cycle Area, Phase, Burst Width
Waveform Histogram Measurements	Waveform Count, Hits in Box, Peak Hits, Median, Maximum, Minimum, Peak-to-Peak, Mean (μ), Standard Deviation (sigma), μ+1sigma, μ+2sigma, μ+3sigma
Eye-pattern Measurements	Extinction Ratio (absolute, %, dB), Eye Height, Eye Width, Eye Top, Eye Base, Crossing %, Jitter (p-p, RMS, 6sigma), Noise (p-p, RMS), Signal/Noise Ratio, Cycle Distortion, Q-factor
Waveform Histograms	A waveform histogram provides an array of data values representing the total number of hits inside of a user-defined region of the display. A waveform histogram is both a visual graph of the hit distribution as well as a numeric array of values that can be measured. Sources – Channel 1, Channel 2, Channel 3, Channel 4, Ref 1, Ref 2, Ref 3, Ref 4, Math 1, Math 2, Math 3, Math 4 Types – Vertical, Horizontal

Waveform Processing/Math

Characteristic	Description
Number of Math Waveforms	Up to 4
Arithmetic	Add, Subtract, Multiply, Divide waveforms and scalars
Algebraic Expressions	Define extensive algebraic expressions including waveforms, scalars, user-adjustable variables, and results of parametric measurements. Perform math on math using complex equations. e.g. (Integral (CH1 – Mean(CH1)) × 1.414 × VAR1)
Math Functions	Average, Invert, Integrate, Differentiate, Square Root, Exponential, Log_{10}, Log_e, Abs, Ceiling, Floor, Min, Max, Sin, Cos, Tan, ASin, ACos, ATan, Sinh, Cosh, Tanh
Relational	Boolean result of comparison >, <, ≥, ≤, ==, !=
Frequency Domain Functions (FFT)	Spectral Magnitude and Phase, Real and Imaginary Spectra
FFT Vertical Units	Magnitude: Linear, dB, dBm Phase: Degrees, radians, group delay
FFT Window Functions	Rectangular, Hamming, Hanning, Kaiser-Bessel, Blackman-Harris, Gaussian, Flattop2, Tek Exponential
Waveform Definition	As an arbitrary math expression
Filtering Functions	User-definable filters. Users specify a filter containing the coefficients of the filter. Filter files provided
Mask Function	A function that generates a waveform database pixmap from a sample waveform. Sample count can be defined

Software

Software	Description
NI LabVIEW SignalExpress Tektronix Edition	A fully interactive measurement software environment optimized for the DPO7000C Series enables you to instantly acquire, generate, analyze, compare, import, and save measurement data and signals using an intuitive drag-and-drop user interface that does not require any programming. Standard DPO7000C Series support for acquiring, controlling, viewing, and exporting your live signal data is permanently available through the software. The full version (SIGEXPTE) adds additional signal processing, advanced analysis, mixed signal, sweeping, limit testing, and user-defined step capabilities and is available for a 30-day trial period standard with each instrument.
IVI Driver	Provides a standard instrument programming interface for common applications such as LabVIEW, LabWindows/CVI, Microsoft .NET and MATLAB. IVI-COM standard
LXI Class C Web Interface	Connect to the DPO7000C Series through a standard web browser by simply entering the oscilloscope's IP address in the address bar of the browser. The web interface enables viewing of instrument status and configuration, as well as status and modification of network settings. All web interaction conforms to LXI Class C specification

Display Characteristics

Characteristic	Description
Display Type	Liquid-crystal active-matrix color display with touch screen
Display Size	Diagonal: 12.1 in. (307 mm)
Display Resolution	1024 horizontal × 768 vertical pixels (XGA)
Waveform Styles	Vectors, Dots, Variable Persistence, Infinite Persistence
Color Palettes	Normal, Green, Gray, Temperature, Spectral, and User Defined
Display Format	YT, XY

Computer System and Peripherals

Characteristic	Description
Operating System	Windows 7 Ultimate 64-bit
CPU	Intel Core 2 Duo, ≥2 GHz processor
PC System Memory	≥8 GB
Hard Disk Drive	Removable hard disk drive, ≥160 GB capacity (2.5 in. SATA)
CD/DVD Drive	Front-panel CD-R/W, DVD-R drive
Mouse	Optical wheel mouse, USB interface
Keyboard	Order 119-7083-xx for small keyboard; USB interface and hub

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Input/Output Ports

Port	Description
USB 2.0 High-speed Host Ports	Supports USB mass storage devices, printers, keyboard, and mouse. Ports on front and side panels of the instrument. Can be disabled individually
GPIB Port	Rear-panel IEEE488.2 connector
LAN Port	RJ-45 connector, supports 10/100/1000BASE-T
Video Out Port	DVI-I connector, connect to show the oscilloscope display on an external monitor or projector. Support for extended desktop and clone mode
Audio Ports	Miniature phono jacks
Keyboard Port	PS/2 compatible
Mouse Port	PS/2 compatible
Auxiliary Input	Front-panel TekVPI connector. Max input 150 V CAT I
Auxiliary Out (Software switchable)	Trigger Out: A TTL compatible pulse when the oscilloscope triggers Time Base Reference Out: A TTL compatible output of internal 10 MHz reference oscillator
External Reference In	Time base system can phase lock to an external 10 MHz reference (10 MHz ±1%)
Analog Signal Output	BNC connector provides a buffered version of the Ch3 signal. 50 mV/div ±20% into a 1 MΩ load, 25 mV/div ±20% into a 50 Ω load. Bandwidth is 100 MHz into a 50 Ω load
Probe Compensator Output	Front-panel pins Amplitude: 1 V ±20% into a ≥50 Ω load Frequency: 1 kHz ±5%
Recovered Clock (DPO7254C and DPO7354C only)	(Enabled by Opt. MTM.) BNC connector, ≤1.25 Gb/s, output swing ≥130 mV_{p-p} into 50 Ω
Recovered Data (DPO7254C and DPO7354C only)	(Enabled by Opt. MTM.) BNC connector, ≤1.25 Gb/s, output swing 200 mV into 50 Ω

LAN eXtensions for Instrumentation (LXI)

Characteristic	Description
Class	LXI Class C
Version	V1.3

Power Source

Characteristic	Description
Power Source	100 to 240 V ±10%, 47 to 63 Hz, <550 W 115 V_{RMS} ±10%, 360 to 440 Hz, CAT I, <500 VA

Physical Characteristics

Benchtop Configuration

Dimension	mm	in.
Height	292	11.48
Width	451	17.75
Depth	265	10.44
Weight	**kg**	**lb.**
Net	15	32
Shipping	28.9	63.75

Rackmount Configuration

Dimension	mm	in.
Height	331	12.25
Width	479	18.85
Depth (from rackmounting ear to back of instrument)	231.75	9.12
Weight	**kg**	**lb.**
Net	17.4	37.5
Rackmount Kit	2.5	5.5

Required Cooling Clearance

Dimension	mm	in.
Top	0	0
Bottom	0	0
Left Side	76	3
Right Side	0	0
Front	0	0
Rear	0	0

Environmental

Characteristic	Description
Temperature	
Operating	0 °C to +50 °C, excluding CD-R/W drive +10 °C to +45 °C, including CD-R/W drive
Nonoperating	–40 °C to +71 °C
Humidity	
Operating	5% to 95% relative humidity (RH) with a maximum wet bulb temperature of 29 °C at or below +50 °C, noncondensing. Upper limit derated to 45% RH from +30 °C to +50 °C
Nonoperating	5% to 95% relative humidity (RH) with a maximum wet bulb temperature of 29 °C at or below +50 °C, noncondensing. Upper limit derated to 45% RH from +30 °C to +50 °C
Altitude	
Operating	10,000 ft. (3,048 m)
Nonoperating	40,000 ft. (12,190 m)
Regulatory	
Electromagnetic Compatibility	2004/108/EC
Certifications	UL61010-1, Second Edition; CSA61010-1 Second Edition, EN61010-1:2001; IEC 61010-1:2001

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Ordering Information

DPO7000C Series

Product	Description
DPO7054C	500 MHz, 5/10/20 GS/s (4/2/1 ch), 12.5M record length, 4-channel digital phosphor oscilloscope
DPO7104C	1 GHz, 5/10/20 GS/s (4/2/1 ch), 12.5M record length, 4-channel digital phosphor oscilloscope
DPO7254C	2.5 GHz, 10/20/40 GS/s (4/2/1 ch), 12.5M record length, 4-channel digital phosphor oscilloscope
DPO7354C	3.5 GHz, 10/20/40 GS/s (4/2/1 ch), 12.5M record length, 4-channel digital phosphor oscilloscope

All Models Include: One passive voltage probe per analog channel (P6139B: 500 MHz, 10X, 8 pF), accessory pouch, front cover, mouse, 013-0347-00 VGA to DVI adapter, quick-start user manual, DPO7000C Series product software media and documentation including performance verification and programmer's manual, NI LabVIEW SignalExpress Tektronix Edition software, Calibration Certificate documenting measurement traceability to National Metrology Institute(s), Z 540-1 Compliance and ISO9001, power cord, one-year warranty.

Note: Please specify power plug and manual language version when ordering.

Instrument Options

Record Length Options

Option	DPO7054C DPO7104C	DPO7254C DPO7354C
Opt. 2RL	125M max, 25M/ch	125M max, 25M/ch
Opt. 5RL	250M max, 50M/ch	250M max, 50M/ch
Opt. 10RL	—	500M max, 125M/ch

Sample Rate Options

Option	DPO7104C	DPO7054C DPO7254C DPO7354C
Opt. 2SR	Double maximum real-time sample rate to 40/20/10 GS/s on 1/2/4 ch	—

Solid State Hard Disk Drive Options

Option	Description
Opt. SSD	Solid State Hard Disk Drive

Software Options

Option	Description
Opt. DDRA*1, 2	DDR Memory Bus Analysis
Opt. DJA	Jitter and Eye Analysis Tools – Advanced (DPOJET)
Opt. D-PHY*1, 3	MIPI® D-PHY Essentials – Transmitter Debug, Characterization, and Compliance Test Solution
Opt. DVI*4	Digital Visual Interface Compliance Testing
Opt. ET3*5	Ethernet Compliance Testing
Opt. LSA	Low-speed Automotive Serial Analysis, includes CAN Trigger, CAN/LIN Decode and Analysis
Opt. LT	Waveform Limit Testing
Opt. MTM	Mask Testing for ITU-T, ANSI T1.102, Ethernet, SONET/SDH, Fibre Channel, USB 2.0, IEEE 1394b, Rapid I/O, OIF, CPRI, and Serial Video; (includes hardware clock recovery on DPO7254C/DPO7354C)
Opt. PWR	Power Measurement and Analysis
Opt. SR-COMP	Computer Serial Triggering and Analysis (RS-232/422/485/UART). Enables triggering on packet-level information on RS-232/422/485/UART buses as well as analytical tools such as digital views of the signal, bus views, and packet decoding
Opt. SR-CUST	Custom Serial Analysis Kit for Developers
Opt. SR-DPHY	MIPI® D-PHY Serial Analysis. Enables analysis of MIPI DSI-1 and CSI-2 buses with analytical tools such as digital views of the signal, bus views, and packet decoding
Opt. SR-EMBD	Embedded Serial Triggering and Analysis (I^2C, SPI). Enables triggering on packet-level information on I^2C and SPI buses as well as analytical tools such as digital views of the signal, bus views, and packet decoding
Opt. SR-USB	USB 2.0 Serial Triggering and Analysis (LS, FS, HS). Enables triggering on packet-level content for low-speed and full-speed USB serial buses. Also enables analytical tools such as digital views of the signal, bus views, and packet decoding for low-speed, full-speed, and high-speed USB serial buses. USB High Speed supported only on ≥1 GHz models
Opt. ST1G*3	8b/10b Serial Protocol Trigger and Decode up to 1.25 Gb/s
Opt. SVE	SignalVu Essentials Vector Signal Analysis
Opt. SVM*6	SignalVu General Purpose Modulation Analysis
Opt. SVO*6	Flexible OFDM Analysis
Opt. SVP*6	SignalVu Pulse Advanced Signal Analysis
Opt. SVT*6	Settling Time Measurements – Frequency and Phase
Opt. USB*8	USB 2.0 Compliance Testing
Opt. VET	Visual Trigger and Search
TekExpress Application Framework	
TEKEXP	TekExpress Application Framework
TEKEXP Opt. D-PHYTX*1, 3	D-PHY Automated Solution
TEKEXP Opt. HEAC*3, 7	HEAC Automated Solution
TEKEXP Opt. XGbT*4	10GBASE-T Automated Solution
Bundle Options	
Opt. PS1	Power Solution Bundle: DPOPWR, P5205A, TCP0030, TPA-BNC, 067-1686-xx (Deskew Fixture)

*1 Requires Opt. DJA.

*2 Available on ≥1 GHz models only.

*3 Available on ≥2.5 GHz models only.

*4 Available on DPO7354C model only.

*5 Requires TF-GBE-BTP or TF-GBE-ATP Ethernet Test Fixture.

*6 Requires Opt. SVE.

*7 Requires Opt. 2RL, DJA, MTM, and ST1G.

*8 Requires TDSUSBF (USB Test Fixture). ≥2 GHz bandwidth required for high-speed USB.

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Floating Option Licenses

Floating licenses offer an alternative method to manage your Tektronix asset. Floating licenses allow license-key enabled options to be easily moved among all your MSO/DPO5000, DPO7000, and DPO/DSA/MSO70000 Series of Tektronix oscilloscopes. Floating licenses are available for the following license-key enabled options.

Check www.tek.com/products/oscilloscopes/floatinglicenses for additional information about floating license options.

Option	Description
DPOFL-DDRA*[1, 2]	DDR Memory Bus Analysis
DPOFL-DJA	Jitter and Eye Analysis Tools – Advanced (DPOJET)
DPOFL-D-PHY*[1, 3]	MIPI® D-PHY Transmitter Debug, Characterization and Compliance Test Solution
DPOFL-DVI*[4]	Digital Visual Interface Compliance Testing
DPOFL-ET3*[5]	Ethernet Compliance Testing
DPOFL-LSA	Low-speed Automotive Serial Analysis, includes CAN Trigger, CAN/LIN Decode and Analysis
DPOFL-LT	Waveform Limit Testing
DPOFL-MTM	Mask Testing for ITU-T, ANSI T1.102, Ethernet, SONET/SDH, Fibre Channel, USB 2.0, IEEE 1394b, Rapid I/O, OIF, CPRI, and Serial Video; (includes hardware clock recovery on DPO7254C/DPO7354C)
DPOFL-PWR	Power Measurement and Analysis
DPOFL-SR-COMP	Computer Serial Triggering and Analysis (RS-232/422/485/UART). Enables triggering on packet-level information on RS-232/422/485/UART buses as well as analytical tools such as digital views of the signal, bus views, and packet decoding
DPOFL-SR-CUST	Custom Serial Analysis Kit for Developers
DPOFL-SR-DPHY	MIPI® D-PHY Serial Analysis. Enables analysis of MIPI DSI-1 and CSI-2 buses with analytical tools such as digital views of the signal, bus views, and packet decoding
DPOFL-SR-EMBD	Embedded Serial Triggering and Analysis (I^2C, SPI). Enables triggering on packet-level information on I^2C and SPI buses as well as analytical tools such as digital views of the signal, bus views, and packet decoding
DPOFL-SR-USB	USB 2.0 Serial Triggering and Analysis (LS, FS, HS). Enables triggering on packet-level content for low-speed and full-speed USB serial buses. Also enables analytical tools such as digital views of the signal, bus views, and packet decoding for low-speed, full-speed, and high-speed USB serial buses. USB High Speed supported only on ≥1 GHz models
DPOFL- ST1G*[3]	8b/10b Serial Protocol Trigger and Decode up to 1.25 Gb/s
DPOFL-SVE	SignalVu Essentials Vector Signal Analysis
DPOFL-SVM*[6]	SignalVu General Purpose Modulation Analysis
DPOFL-SVO*[6]	Flexible OFDM Analysis
DPOFL-SVP*[6]	SignalVu Pulse Advanced Signal Analysis
DPOFL-SVT*[6]	Settling Time Measurements – Frequency and Phase
DPOFL-USB*[8]	USB 2.0 Compliance Testing
DPOFL-VET	Visual Trigger and Search

*[1] Requires Opt. DJA.

*[2] Available on ≥1 GHz models only.

*[3] Available on ≥2.5 GHz models only.

*[4] Available on DPO7354C model only.

*[5] Requires TF-GBE-BTP or TF-GBE-ATP Ethernet Test Fixture.

*[6] Requires Opt. SVE.

*[8] Requires TDSUSBF (USB Test Fixture). ≥2 GHz bandwidth required for high-speed USB.

Power Plug Options

Option	Description
Opt. A0	North America
Opt. A1	Universal European Union
Opt. A2	UK
Opt. A3	Australia
Opt. A5	Switzerland
Opt. A6	Japan
Opt. A10	China
Opt. A11	India
Opt. A12	Brazil
Opt. A99	No power cord

User Manual Options

Option	Description
Opt. L0	English manual
Opt. L1	French manual
Opt. L3	German manual
Opt. L5	Japanese manual
Opt. L7	Simplified Chinese manual
Opt. L8	Traditional Chinese manual
Opt. L9	Korean manual
Opt. L10	Russian manual
Opt. L99	No user manual

Service Options*[9]

Option	Description
Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. G3	Complete Care 3 Years (includes loaner, scheduled calibration and more)
Opt. G5	Complete Care 5 Years (includes loaner, scheduled calibration and more)
Opt. R3	Repair Service 3 Years (including warranty)
Opt. R5	Repair Service 5 Years (including warranty)

*[9] Probes and accessories are not included in the oscilloscope warranty. Refer to the data sheet for each probe for its unique warranty and calibration terms.

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Recommended Accessories

Probes

Tektronix offers over 100 different probes to meet your application needs. For a comprehensive listing of available probes, please visit www.tektronix.com/probes.

Probe	Description
TAP3500	3.5 GHz TekVPI active single-ended probe
TAP2500	2.5 GHz TekVPI active single-ended probe
TAP1500	1.5 GHz TekVPI active single-ended probe
TDP3500	3.5 GHz TekVPI differential voltage probe with ±2 V differential input voltage
TDP1500	1.5 GHz TekVPI differential voltage probe with ±8.5 V differential input voltage
TDP1000	1 GHz TekVPI differential voltage probe with ±42 V differential input voltage
TDP0500	500 MHz TekVPI differential voltage probe with ±42 V differential input voltage
TCP0150	20 MHz TekVPI™ 150 Ampere AC/DC current probe
TCP0030	120 MHz TekVPI 30 Ampere AC/DC current probe
TMDP0200	±750 V, 200 MHz high-voltage differential probe
THDP0200	±1.5 kV, 200 MHz high-voltage differential probe
THDP0100	±6 kV, 100 MHz high-voltage differential probe
P5100A	2.5 kV, 500 MHz, 100X high-voltage passive probe
P6015A	20 kV, 75 MHz high-voltage passive probe
P6158	3 GHz, 20X low-capacitance passive probe

*10 Requires TekVPI® to TekProbe BNC adapter (TPA-BNC).

Accessories

Accessory	Description
077-0076-xx	Service Manual (English PDF only)
077-0010-10	Programmer Manual (English PDF only)
077-0063-05	Performance Verification and Specifications Manual (English PDF only)
SIGEXPTE	NI LabVIEW SignalExpress Tektronix Edition Software (Full Version)
016-1985-02	Rackmount Kit
065-0881-xx	Removable HD Spare with rotational media
016-1979-xx	Front HD option for Rackmount Kit
119-7083-xx	Mini Keyboard (USB interface)
119-6297-xx	Full-size keyboard with 4-port USB hub
016-1970-xx	Transit Case
K420	Oscilloscope Cart

Cables

Cable	Description
012-0991-xx	GPIB Cable (1 m)
012-0991-xx	GPIB Cable (2 m)

Test Fixtures

Fixture	Description
067-1686-xx	Probe Calibration / Power Deskew Test Fixture
TDSUSBF	Test fixture for use with Opt. USB
TF-GBE-BTP	Basic test package for 10/100/1000BASE-T Ethernet tests
TF-GBE-ATP	Advanced test package for 10/100/1000BASE-T Ethernet (includes 1000BASE-T jitter test channel cable)
TF-GBE-EE	Additional test fixture for Energy Efficient Ethernet measurements. Order through Crescent Heart Software (http://www.c-h-s.com)

Adapters

Adapter	Description
TPA-BNC	TekVPI-to-TekProbe BNC Adapter
P6701B*10	Optical/Electrical Converter (Multi Mode)
P6703B*10	Optical/Electrical Converter (Single Mode)

*10 Requires TekVPI® to TekProbe BNC adapter (TPA-BNC).

Software

Software	Description
SIGEXPTE	NI LabVIEW SignalExpress™ Tektronix Edition Software (Full Version)

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Instrument Upgrades

To upgrade your DPO7000C Series oscilloscope, order DPO-UP and option listed below. For example, DPO-UP DDRA.

Option	Description
To upgrade record length:	
RL02	From Standard Configuration to Opt. 2RL Configuration
RL05	From Standard Configuration to Opt. 5RL Configuration
RL010	From Standard Configuration to Opt. 10RL Configuration
RL25	From Opt. 2RL Configuration to Opt. 5RL Configuration
RL210	From Opt. 2RL Configuration to Opt. 10RL Configuration
RL510	From Opt. 5RL Configuration to Opt. 10RL Configuration
To upgrade DPO7000C Series with:	
DDRA*1, 2	Add Opt. DDRA
DJAM	Add Opt. DJA – Jitter and Eye Analysis Tools - Advanced (DPOJET)
D-PHY*1, 3	Add Opt. D-PHY – MIPI® D-PHY Transmitter Debug, Characterization, and Compliance Test Solution
DVI*4	Add Opt. DVI – Digital Visual Interface Compliance Testing
ET3*5	Add Opt. ET3 – Ethernet Compliance Testing
LSA	Add Opt. LSA – CAN/LIN Trigger, Decode, and Analysis
LT	Add Opt. LT – Waveform Limit Testing
MTM	Add Opt. MTM – Mask Testing
PWR	Add Opt. PWR – Power Measurement and Analysis
SR-COMP	Add Opt. SR-COMP – Computer Serial Triggering and Analysis (RS-232/422/485/UART)
SR-CUST	Add Opt. SR-CUST – Custom Serial Analysis Kit for Developers
SR-DPHY	Add Opt. SR-DPHY – MIPI® D-PHY Serial Analysis (DSI-1 and CSI-2)
SR-EMBD	Add Opt. SR-EMBD – Embedded Serial Triggering and Analysis (I^2C, SPI)
SR-USB	Add Opt. SR-USB – USB 2.0 Serial Triggering and Analysis (LS, FS, HS)
SSD	Add Opt. SSD – Solid State Hard Drive
ST1G*3	Add Opt. ST1G – 8b/10b Serial Protocol Trigger and Decode up to 1.25 Gb/s
SVEM	Add Opt. SVE – SignalVu Essentials Vector Signal Analysis
SVM*6	Add Opt. SVM – SignalVu General Purpose Modulation Analysis
SVO*6	Add Opt. SVO – Flexible OFDM Analysis
SVP*6	Add Opt. SVP – SignalVu Pulse Advanced Signal Analysis
SVT*6	Add Opt. SVT – Settling Time Measurements - Frequency and Phase
USB*8	Add Opt. USB – USB 2.0 Compliance Testing
VETM	Add Opt. VET – Visual Trigger and Search

*1 Requires Opt. DJA.

*2 Available on ≥1 GHz models only.

*3 Available on ≥2.5 GHz models only.

*4 Available on DPO7354C model only.

*5 Requires TF-GBE-BTP or TF-GBE-ATP Ethernet Test Fixture.

*6 Requires Opt. SVE.

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CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**

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